said measuring volume,

- taking measurements using detecting optics, at measuring times of ≤ 500 ms, of said fluorescence, which determine material-specific parameters of said molecule, and
- correlation of said material specific parameters.

86. The method according to claim 85, wherein said material-specific parameters are translational diffusion coefficients, rotational diffusion coefficients, excitation and emission wavelengths, life of luminescing state of said substituent, or combinations thereof.

87. The method according to claim 86 wherein space coordinates of the measuring volume are varied with respect to space coordinates of the sample (i) by moving the sample with respect to the measuring volume, (ii) by varying positioning of the laser beam, (iii) by varying positioning of the detecting optics or (iv) combinations, thereof, with time measured translational diffusion coefficients corresponding to a combination of actual translational diffusion coefficients and superimposed relative positional change of coordinates of the measuring volume.

88. The method according to claim 87, whereby the change of coordinates of the measuring volume with time defines an apparent diffusion time of a molecule coupled to a luminescing substituent.

89. The method according to claim 86 wherein the substituent is a

chromophorous ligand, a luminophorous ligand, or a luminophore-labeled ligand having spectroscopic parameters which are correlated with a property or function of said molecule.

90. The method according to claim 89, wherein said correlation, through measurements to determine the translational diffusion, rotational diffusion, or both said transnational and rotational diffusion, involves at least one of

- determining the absolute number of molecules in said measuring volume,
- determining variations, with time, of the absolute number of molecules in said measuring volume,
- determining specific concentrations of structurally distinct ligands or ligand-molecule complexes in said measuring volume, using thermodynamic binding constants between said ligands and said molecules, rate constants of recognition reactions between said ligands and said molecules, enzymatic processes involving complexes formed between said ligands and said molecules, or combinations thereof.

91. The method according to claim 90, wherein the molecules or molecule-ligand complexes are ionic.

92. The method according to claim 90, wherein the molecules or molecule-ligand complexes are non-ionic.

93. The method according to claim 90 wherein the measurements take place

within a superimposed electric or magnetic field, which is constant or varying with time.

94. The method according to claim 93, wherein the molecules or molecule-ligand complexes are ionic and are forced through the measuring volume, or held in the measuring volume by a rectified electric field or an alternating electric field.

95. The method according to claim 93, wherein the measurements take place within said electric field, which effects an electric molecular trap, whereby a luminophore-labeled ligand bears a smaller charge than, or a charge opposite to that of, said target molecule, which forms a complex with said ligand.

96. The method according to claim 95 further comprising electrophoretic separation of free luminophore-labeled ligands, from specifically complexed ligands.

97. The method according to claim 90 further comprising, prior to said exposing step, concentrating complexes of the labeled ligand and the molecule in a first electrophoresis step and transporting the complexes formed into the measuring volume in a second electrophoresis step.

98. A method according to claim 90 wherein the substituent is one or both of the luminophorous ligand or the luminophore -labeled ligand having an extinction coefficient $\geq$ 30,000, with a quantum yield $\geq$ 0.1, or the substituent is the chromophorous ligand, which comprises one or more dye oligomers.

99. The method according to claim 85, comprising a plurality of the

measuring volumes, which are arranged at a distance of $\leq$ 1000 μm from an emergence objective of said detecting optics, which is either directly in contact with the sample or separated from the sample only by a transparent sheet.

100. The method according to claim 85 involving assaying a molecule or molecules in a plurality of samples, whereby said samples are arranged linearly or two dimensionally on a membrane, sheet, or wafer surface.

101. The method according to claim 100, whereby said samples are generated by a microdispensing system.

102. The method according to claim 85, wherein said sample comprises cells of various genotypes, said molecules are DNA or RNA associated with cells of one genotype of said genotypes, and said substituent selectively binds said one genotype.

103. The method of claim 85, wherein said assay screens a substance for potential pharmacological activity by its interaction with said molecules, wherein said substituent is a luminescent-labeled non-natural ligand, and wherein binding of the luminescent-labeled non-natural ligand to said molecules is a function of said interaction.

104. The method according to claim 103 wherein interaction of the potentially active substance with said molecules and the luminescent-labeled non-natural ligand involves molecules whose differential binding potential is determined through